



US005888126A

**United States Patent** [19][11] **Patent Number:** **5,888,126****Hirose et al.**[45] **Date of Patent:** **Mar. 30, 1999**

[54] **POLISHING APPARATUS INCLUDING  
TURNTABLE WITH POLISHING SURFACE  
OF DIFFERENT HEIGHTS**

[75] Inventors: Masayoshi Hirose, Yokohama; Yoshimi Sasaki, Atsugi; Akira Ogata; Seiji Ishikawa, both of Yokohama; Tamami Takahashi, Yamato; Hirokuni Hiyama, Tokyo; Yutaka Wada, Yokohama, all of Japan

[73] Assignee: Ebara Corporation, Tokyo, Japan

[21] Appl. No.: 590,836

[22] Filed: Jan. 24, 1996

[30] Foreign Application Priority Data

Jan. 25, 1995	[JP]	Japan	7-028722
Jul. 20, 1995	[JP]	Japan	7-206594

[51] Int. Cl.<sup>6</sup> B24B 29/02

[52] U.S. Cl. 451/287; 451/288; 451/495; 451/527

[58] Field of Search 451/41, 293, 285, 451/287, 288, 289, 290, 495, 520, 527, 528, 530

[56] References Cited

**U.S. PATENT DOCUMENTS**

3,603,042	9/1971	Boettcher	451/288
5,081,795	1/1992	Tanaka et al.	451/288
5,212,910	5/1993	Breivogel et al.	451/287 X
5,216,843	6/1993	Breivogel et al.	451/287 X

5,297,364	3/1994	Tuttle	451/527
5,435,772	7/1995	Yu	451/288 X
5,558,563	9/1996	Cote et al.	451/288 X
5,562,529	10/1996	Kishii et al.	451/289 X
5,564,965	10/1996	Tanaka et al.	451/287

**FOREIGN PATENT DOCUMENTS**

26596	2/1979	Japan	451/288
117064	6/1986	Japan	451/288
3-259520	11/1991	Japan	

Primary Examiner—Timothy V. Eleg  
Attorney, Agent, or Firm—Wenderoth, Lind & Ponack, L.L.P.

**[57] ABSTRACT**

A polishing apparatus includes a turntable with an abrasive cloth mounted on an upper surface thereof, and a top ring disposed above the turntable for supporting a workpiece to be polished and pressing the workpiece against the abrasive cloth under a predetermined pressure. The turntable and the top ring are movable relatively to each other to polish a surface of the workpiece supported by the top ring with the abrasive cloth. The abrasive cloth has a projecting region on a surface thereof for more intensive contact with the workpiece than other surface regions of the abrasive cloth. The projecting region has a smaller dimension in a radial direction of the turntable than a diameter of the workpiece when the projecting region is held in contact with the workpiece. A position of the projecting region is determined on the basis of an area in which the projecting region acts on the workpiece.

**21 Claims, 21 Drawing Sheets**